THE INDICATIONS FOR AND THE RESULTS OF ANCHORING HEAD OF COLON *

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Having frequently observed a severe and often excruciating type of headache in patients afflicted by lowering and distention of the head of the colon, I endeavored several years ago to determine if this deformity were responsible, in part at least, for the suffering of such individuals.

Pictures following the barium meal in these patients would in many cases show not only a filling defect, but an abnormal retention period extending from thirty-six to seventy-two hours, and even longer, in certain patients who suffered more severely and over a longer period of time. In some the headaches were of daily occurrence, while others would experience them only every third or fourth day, or perhaps once a week. The longer the interval between the attacks, the more severe the onset and the greater the mental and physical depression after the spell had worn off. These seizures were frequently of a semi-epileptiform character and often left the patient in much the same condition as that following such paroxysms.

Careful study of the development of the colon, both before and after its rotation, is interesting and gives a better understanding of the resulting deformities following the advent of adhesions, kinking and distention, which in sequence follow faulty digestion, partial obstruction, and inflammatory processes. The cecum varies in shape, but, according to Trevis, in man it may be classified under one of four types. In early fetal life it is short, conical, and broad at the base, with its apex turned upward and medialward toward the ileocolic junction. It then resembles the cecum of some monkeys, e. g., Mangabey monkey. As the fetus grows, the cecum increases in length more than in breadth so that it forms a longer tube than in the primitive form and without the broad base, but with the same inclination of the apex toward the ileocolic junction. This form is seen in other monkeys, e. g., the spider monkey. As development goes on, the lower part of the tube ceases to grow and the upper part becomes greatly increased, so that at birth there is a narrow tube, the vermiform process, hanging from a conical projection, the cecum. This is the infantile form, and as it persists throughout life in about 2 per cent of cases, it is regarded by Trevis as the first of his four types of human ceca. The cecum is conical and the appendix rises from its apex. The three longitudinal bands start from the appendix and are equidistant from each other.

In the second type, the conical cecum has become quadrate by the growing out of a saccule on either side of the anterior longitudinal band; these saccule are of equal size, and the appendix rises from between them, instead of from the apex of a cone. This type is found in about 3 per cent of cases. The third type is the normal type of man. Here the two saccules, which in the second type were uniform, have grown at unequal rates—the right with greater rapidity than the left. In consequence of this, an apparently new apex has been formed by the growing downward of the right saccule, and the original apex, with the appendix attached, is pushed over to the left toward the ileocolic junction. The three longitudinal bands still start from the base of the vermiform process, but they are now no longer equidistant from each other, because the right saccule has grown between the anterior and posteriolateral bands, pushing them over to the left. This type occurs in about 90 per cent of cases. The fourth type is merely an exaggerated condition of the third; the right saccule is still larger, and at the same time the left saccule has become atrophied, so that the original apex of the cecum, with the veriform process, is close to the ileocolic junction, and the anterior band courses medialward to the same situation. This type is present in about 4 per cent of cases.

Now it can be readily seen that the original conical apex of the colon marking the termination of the three longitudinal bands having been drawn medialward gives the cecum a hook shape and especially when we consider the absence of any restraining bands on its lateral surface. The greater the distention of the outer saccule the greater the tendency to curl toward the median line until a well defined angulation occurs at the termination of the longitudinal bands which have been crowded inward by the distention. As a result of this angulation and the partial obstruction it affords, a pouch is formed, the emptying of which is thus mechanically interfered with, and to a certain extent, also by a reverse peristalsis common to this portion of the bowel. Had the fetal cecum continued to develop in uniform size to the tip of the appendix no such deformity would have resulted and the toxicity incident to retention would have been avoided. However, local deformity should not always be regarded as the only cause of obstruction in this portion of the bowel. A careful study of the entire colon is necessary.

Case discusses colonic peristalsis under normal and pathological conditions and calls attention to the diagnostic and operative errors which may occur if the changing appearance of the colonic shadow during peristalsis is not known. Particular emphasis is laid upon the prolonged stay of food residue in the cecum and proximal colon, and the resulting pain in the right side suggesting appendiceal involvement, which in realty may be due to some obstructing organic or functional lesion in the distal colon or rectum. The motor function he considers of greater significance than the morphological factor.

Peck, in reporting 138 cases of obstructive lesions of the colon and ileocecal region, exclusive of the signoid and rectum, classified them as follows: Of 103 non-malignant cases he found 26 due to post-operative conditions; post-inflammatory and congenital bands and adhesions, 58; diverticulitis, 8; tuberculosis of cecum or colon, 8; mega colon, 3. There were 35 cases of obstruction due to carcinoma. The obstruction occurred in the cecum, in

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3; in the ascending colon and hepatic flexure, 12; in the transverse colon, 3; in the descending colon and splenic flexure, 5; and in the sigmoid, 12. In the post-operative cases omental and peritonal bands and adhesions were the usual offenders. In some of these the condition was remedied only with much difficulty, while in others it was easily relieved. Peck warns against sweeping iodine from the skin into the peritoneal cavity and rinsing the hands in bi-chloride solution before introducing them into the abdomen. The typical Jackson's membrane he found to consist of short, tense peritoneal bands which usually were attached to the ascending colon at its anterior longitudinal band, so that they fixed and constricted the gut to a varying degree, and rotated it to the right on its long axis, often from 60 to 90 degrees.

The intoxication resulting from the colon retention is both local and general. The local effect is upon the nerve endings in the wall of the bowel. Here we have the plexus of Auerbach situated within the muscle wall, and the plexus of Meissner situated beneath the mucus membrane. Intoxication of these and the nerve filaments derived from them interferes with both efferent and afferent impulses necessary for reflex action, and we have as a result another example of the "Vicious Circle": lessened mobility, longer retention; longer retention, greater intoxication; greater intoxication, lessened mobility. The evil systemic results following this condition, especially where the entire colon is involved, can be readily appreciated. The immediate disturbance of liver function and the secondary central and peripheral changes are too well understood to warrant discussion.

Adhesions must be separated and all fibrous bands which in any way have to do with angulation or kinking must be cut in order that the colon may be liberated and allowed to lie without restraint, and in contact with the parietal peritoneum in the right flank. Here it is secured by a running suture uniting the lateral longitudinal band to a fold of the peritoneum for a distance of from 5 to 6 inches, taking care to so complete the work that no channel is left between the new line of attachment and the mesa colon through which a hernia might develop.

I first ventured to undertake the procedure nine years ago at the close of an abdominal operation for some pelvic trouble, and the removal of the appendix. The patient had suffered the most excrutiating periodic headaches I have ever observed. She was for some time in the care of the late Dr. Elbert Wing, who studied her case carefully from the neuropathic standpoint, but was able to do little more than secure partial relief from sedative treatment. Following the straightening and anchoring of her colon the headaches were very much improved, and as time went on they grew less and less noticeable and finally ceased. I have now done the operation 28 times, but never as a separate procedure. In connection with other work I have anchored the head of the colon in such patients as have suffered the character of headaches described.

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THE PHYSIOLOGICAL EFFECTS OF NITROUS OXIDE*

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This paper is the result of an attempt to straighten out in my own mind the physiological effects of N_2O. It is a subject of fundamental importance. If we do not have a clear knowledge of the action of the drug we employ we are on the same footing as the lay anesthetist. If we do not know whether the spasticity of the muscles in a given case is due to lack of O or an excess of CO_2, or to too much or too little N_2O, we must guess at the remedy to be employed, and can consider ourselves as indeed fortunate if we avoid disaster.

Although N_2O was discovered by Priestly 150 years ago, and has been used as an anesthetic for nearly eighty years, it was not until recently that anything was known of its physiological effects except that it would produce anesthesia and, if given too continuously, would lead to asphyxia and death. Long after the effects of such drugs as opium and digitalis and belladonna had been worked out minutely, the action of N_2O remained unknown, and there are still many problems to be solved and hypotheses to be verified. There are several causes to account for this delay in our knowledge of the drug; first, the fact that it is a gas and therefore more difficult to study (and a very inert gas whose presence is not easy to detect); also, that its effects are so extremely transient and are confined almost entirely to the higher nerve cells, and again that O in just the right proportions has to be administered with the gas to avoid confusion arising from asphyxial symptoms.

In any inhalation anesthesia there are the following elements to be considered: the anesthetic agent, the supply of O, the elimination of CO_2 and the N of the air. All of these enter into the problem and render it exceedingly complex, and when we add to this the fact that we are dealing with the question of consciousness (itself the most mysterious of known phenomena), and the response of the organism to traumatic stimuli, we can realize the difficulties of the problems involved. Consciousness, in some wonderful way, results from the inter-activity of an enormous number of separate brain cells, and we are to inhibit that consciousness by modifying that activity.

In all of the earlier experiments with N_2O the unfortunate mistake was made of confusing the anesthesia caused by the gas with unconsciousness, produced by asphyxia; indeed, for many years the two were considered identical. In 1890 H. C. Wood, as the result of a series of experiments, came to the conclusion that ". . . N_2O has no inherent anesthetic properties, but that the loss of consciousness which follows its inhalation is the result of asphyxia—that pure N acts in the same manner, that is by shutting off the O." As late as 1915, Crile stated that in N_2O and O we have two antagonistic agencies which gives us perfect control of the anesthesia—the less O the deeper

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